

WHAT IS CLAIMED IS:

1. A method for peeling off a semiconductor element comprising:

forming over a substrate a first base layer having a plurality of recessed portions;

5 forming on the first base layer a second base layer having a plurality of voids over a plurality of the recessed portions;

forming a third base layer over the second base layer;

forming a semiconductor element over the third base layer; and

10 separating the second base layer at an intersecting surface with a plurality of the voids, thereby peeling off the semiconductor element from the substrate.

2. A method for peeling off a semiconductor element comprising:

forming over a substrate a first base layer having a plurality of recessed portions;

15 forming on the first base layer a second base layer having a plurality of voids over a plurality of the recessed portions;

forming a third base layer over the second base layer;

forming a semiconductor element over the third base layer;

forming an opening portion which extends to a part of each of a plurality of the voids;

and

20 enlarging each of a plurality of the voids by diffusing an etchant into each of a plurality of the voids from the opening portion, and separating the second base layer at an intersecting surface with a plurality of the voids, thereby peeling off the semiconductor element from the substrate.

25 3. A method for peeling off a semiconductor element comprising:

forming over a substrate a first base layer having a plurality of recessed portions;

forming on the first base layer a second base layer having a plurality of voids over a plurality of the recessed portions;

polishing a surface of the second base layer;

30 forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer; and
separating the second base layer at an intersecting surface with a plurality of the voids,
thereby peeling off the semiconductor element from the substrate.

5 4. A method for peeling off a semiconductor element comprising:
 forming over a substrate a first base layer having a plurality of recessed portions;
 forming on the first base layer a second base layer having a plurality of voids over a
plurality of the recessed portions;
 polishing a surface of the second base layer;
10 forming a third base layer over the second base layer whose surface is polished;
 forming a semiconductor element over the third base layer; and
 separating the second base layer with the first base layer at an intersecting surface
with a plurality of the voids, thereby peeling off the semiconductor element from the substrate.

15 5. A method for peeling off a semiconductor element comprising:
 forming over a first substrate a first base layer having a plurality of recessed portions;
 forming on the first base layer a second base layer having a plurality of voids over a
plurality of the recessed portions;
 polishing a surface of the second base layer;
20 forming a third base layer over the second base layer whose surface is polished;
 forming a semiconductor element over the third base layer;
 forming a protective layer so as to cover the semiconductor element;
 attaching a second substrate to the protective layer and attaching a third substrate to
the first substrate; and
25 separating the second base layer at an intersecting surface with a plurality of the voids,
thereby peeling off the semiconductor element and the second substrate from the first substrate
and the third substrate.

30 6. A method for peeling off a semiconductor element comprising:
 forming over a first substrate a first base layer having a plurality of recessed portions;

forming on the first base layer a second base layer having a plurality of voids over a plurality of the recessed portions;

polishing a surface of the second base layer;

forming a third base layer over the second base layer whose surface is polished;

5 forming a semiconductor element over the third base layer;

forming a protective layer so as to cover the semiconductor element;

attaching a second substrate to the protective layer and attaching a third substrate to the first substrate; and

10 separating the second base layer with the first base layer at an intersecting surface with a plurality of the voids, thereby peeling off the semiconductor element and the second substrate from the first substrate and the third substrate.

7. A method for peeling off a semiconductor element comprising:

forming over a substrate a first base layer having a plurality of recessed portions;

15 forming on the first base layer a second base layer having a plurality of voids over a plurality of the recessed portions;

polishing a surface of the second base layer;

forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer;

20 forming an opening portion which extends to a part of each of a plurality of the voids;

and

enlarging each of a plurality of the voids by diffusing an etchant into each of a plurality of the voids from the opening portion, and separating the second base layer at an intersecting surface with a plurality of the voids, thereby peeling off the semiconductor element
25 from the substrate.

8. A method for peeling off a semiconductor element comprising:

forming over a substrate a first base layer having a plurality of recessed portions;

30 forming on the first base layer a second base layer having a plurality of voids over a plurality of the recessed portions;

polishing a surface of the second base layer;
forming a third base layer over the second base layer whose surface is polished;
forming a semiconductor element over the third base layer;
forming an opening portion which extends to a part of each of a plurality of the voids;

5 and

enlarging each of a plurality of the voids by diffusing an etchant into each of a plurality of the voids from the opening portion, and separating the second base layer with the first base layer at an intersecting surface with a plurality of the voids, thereby peeling off the semiconductor element from the substrate.

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9. A method for peeling off a semiconductor element comprising:

forming over a first substrate a first base layer having a plurality of recessed portions;

forming on the first base layer a second base layer having a plurality of voids over a plurality of the recessed portions;

15 polishing a surface of the second base layer;

forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer;

forming an opening portion which extends to a part of each of a plurality of the voids on a region that is not provided with the semiconductor element;

20 forming a protective layer so as to cover the semiconductor element;

attaching a second substrate to the protective layer and attaching a third substrate to the first substrate; and

enlarging each of a plurality of the voids by diffusing an etchant into each of a plurality of the voids from the opening portion, and separating the second base layer at an intersecting surface with a plurality of the voids, thereby peeling off the semiconductor element and the second substrate from the first substrate and the third substrate.

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10. A method for peeling off a semiconductor element comprising:

forming over a first substrate a first base layer having a plurality of recessed portions;

30 forming on the first base layer a second base layer having a plurality of voids over a

plurality of the recessed portions;

polishing a surface of the second base layer;

forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer;

5 forming an opening portion which extends to a part of each of a plurality of the voids on a region that is not provided with the semiconductor element;

forming a protective layer so as to cover the semiconductor element;

attaching a second substrate to the protective layer and attaching a third substrate to the first substrate; and

10 enlarging each of a plurality of the voids by diffusing an etchant into each of a plurality of the voids from the opening portion, and separating the second base layer with the first base layer at an intersecting surface with a plurality of the voids, thereby peeling off the semiconductor element and the second substrate from the first substrate and the third substrate.

15 11. A method for peeling off a semiconductor element comprising:

forming over a substrate a first base layer comprising a metal layer having a plurality of recessed portions and;

forming a metal oxide layer on a surface of the metal layer by oxidizing;

20 forming on the metal oxide layer a second base layer having a plurality of voids over a plurality of the recessed portions;

polishing a surface of the second base layer;

forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer and crystallizing the metal oxide layer; and

25 separating the second base layer at an intersecting surface with a plurality of the voids and a part of the crystallized metal oxide layer, thereby peeling off the semiconductor element from the substrate.

12. A method for peeling off a semiconductor element comprising:

30 forming over a substrate a first base layer comprising a metal layer having a plurality

of recessed portions and;

forming a metal oxide layer on a surface of the metal layer by oxidizing;

forming on the metal oxide layer a second base layer having a plurality of voids over a plurality of the recessed portions;

5 polishing a surface of the second base layer;

forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer and crystallizing the metal oxide layer; and

10 separating the second base layer with the first base layer at an intersecting surface with a plurality of the voids and a part of the crystallized metal oxide layer, thereby peeling off the semiconductor element from the substrate.

13. A method for peeling off a semiconductor element comprising:

15 forming over a first substrate a first base layer comprising a metal layer having a plurality of recessed portions and;

forming a metal oxide layer on a surface of the metal layer by oxidizing;

forming on the metal oxide layer a second base layer having a plurality of voids over a plurality of the recessed portions;

polishing a surface of the second base layer;

20 forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer and crystallizing the metal oxide layer;

forming a protective layer so as to cover the semiconductor element;

25 attaching a second substrate to the protective layer and attaching a third substrate to the first substrate; and

separating the second base layer at an intersecting surface with a plurality of the voids and a part of the crystallized metal oxide layer, thereby peeling off the semiconductor element and the second substrate from the first substrate and the third substrate.

30 14. A method for peeling off a semiconductor element comprising:

forming over a first substrate a first base layer comprising a metal layer having a plurality of recessed portions and;

forming a metal oxide layer on a surface of the metal layer by oxidizing;

5 forming on the metal oxide layer a second base layer having a plurality of voids over a plurality of the recessed portions;

polishing a surface of the second base layer;

forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer and crystallizing the metal oxide layer;

10 forming a protective layer so as to cover the semiconductor element;

attaching a second substrate to the protective layer and attaching a third substrate to the first substrate; and

separating the second base layer with the first base layer at an intersecting surface with a plurality of the voids and a part of the crystallized metal oxide layer, thereby peeling off
15 the semiconductor element and the second substrate from the first substrate and the third substrate.

15. A method for manufacturing a semiconductor element comprising:

forming over a first substrate a first base layer having a plurality of recessed portions;

20 forming on the first base layer a second base layer having a plurality of voids over a plurality of the recessed portions;

forming a third base layer over the second base layer;

forming a semiconductor element over the third base layer;

25 separating the second base layer at an intersecting surface with a plurality of the voids, thereby peeling off the semiconductor element from the first substrate; and

attaching the peeled semiconductor element to a second substrate.

16. A method for manufacturing a semiconductor element comprising:

forming over a first substrate a first base layer having a plurality of recessed portions;

30 forming on the first base layer a second base layer having a plurality of voids over a

plurality of the recessed portions;

polishing a surface of the second base layer;

forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer;

5 separating the second base layer at an intersecting surface with a plurality of the voids,
thereby peeling off the semiconductor element from the first substrate; and

attaching the peeled semiconductor element to a second substrate.

17. A method for manufacturing a semiconductor element comprising:

10 forming over a first substrate a first base layer comprising a metal layer having a
plurality of recessed portions and;

forming a metal oxide layer on a surface of the metal layer by oxidizing;

forming on the metal oxide layer a second base layer having a plurality of voids over
a plurality of the recessed portions;

15 polishing a surface of the second base layer;

forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer and crystallizing the metal
oxide layer;

20 separating the second base layer at an intersecting surface with a plurality of the voids
and a part of the crystallized metal oxide layer, thereby peeling off the semiconductor element
from the first substrate; and

attaching the peeled semiconductor element to a second substrate.

18. A method for manufacturing a semiconductor element comprising:

25 forming over a first substrate a first base layer having a plurality of recessed portions;

forming on the first base layer a second base layer having a plurality of voids over a
plurality of the recessed portions;

forming a third base layer over the second base layer;

forming a semiconductor element over the third base layer;

30 forming an opening portion which extends to a part of each of a plurality of the voids;

enlarging each of a plurality of the voids by diffusing an etchant into each of a plurality of the voids from the opening portion, and separating the second base layer at an intersecting surface with a plurality of the voids, thereby peeling off the semiconductor element from the first substrate; and

5 attaching the peeled semiconductor element to a second substrate.

19. A method for manufacturing a semiconductor element comprising:

forming over a first substrate a first base layer having a plurality of recessed portions;

10 forming on the first base layer a second base layer having a plurality of voids over a plurality of the recessed portions;

polishing a surface of the second base layer;

forming a third base layer over the second base layer whose surface is polished;

forming a semiconductor element over the third base layer;

15 forming an opening portion which extends to a part of each of a plurality of the voids;

enlarging each of a plurality of the voids by diffusing an etchant into each of a plurality of the voids from the opening portion, and separating the second base layer at an intersecting surface with a plurality of the voids, thereby peeling off the semiconductor element from the first substrate; and

attaching the peeled semiconductor element to a second substrate.

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20. A method for peeling off a semiconductor element according to claim 1, wherein the first base layer is formed of an insulating layer.

21. A method for peeling off a semiconductor element according to claim 2, wherein

25 the first base layer is formed of an insulating layer.

22. A method for peeling off a semiconductor element according to claim 3, wherein the first base layer is formed of an insulating layer.

30 23. A method for peeling off a semiconductor element according to claim 4, wherein

the first base layer is formed of an insulating layer.

24. A method for peeling off a semiconductor element according to claim 5, wherein the first base layer is formed of an insulating layer.

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25. A method for peeling off a semiconductor element according to claim 6, wherein the first base layer is formed of an insulating layer.

26. A method for peeling off a semiconductor element according to claim 7, wherein
10 the first base layer is formed of an insulating layer.

27. A method for peeling off a semiconductor element according to claim 8, wherein the first base layer is formed of an insulating layer.

15 28. A method for peeling off a semiconductor element according to claim 9, wherein the first base layer is formed of an insulating layer.

29. A method for peeling off a semiconductor element according to claim 10, wherein the first base layer is formed of an insulating layer.

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30. A method for peeling off a semiconductor element according to claim 3, wherein the polish is performed by CMP.

31. A method for peeling off a semiconductor element according to claim 4, wherein
25 the polish is performed by CMP.

32. A method for peeling off a semiconductor element according to claim 5, wherein the polish is performed by CMP.

30 33. A method for peeling off a semiconductor element according to claim 6, wherein

the polish is performed by CMP.

34. A method for peeling off a semiconductor element according to claim 7, wherein the polish is performed by CMP.

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35. A method for peeling off a semiconductor element according to claim 8, wherein the polish is performed by CMP.

36. A method for peeling off a semiconductor element according to claim 9, wherein
10 the polish is performed by CMP.

37. A method for peeling off a semiconductor element according to claim 10, wherein the polish is performed by CMP.

15 38. A method for peeling off a semiconductor element according to claim 11, wherein the polish is performed by CMP.

39. A method for peeling off a semiconductor element according to claim 12, wherein the polish is performed by CMP.

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40. A method for peeling off a semiconductor element according to claim 13, wherein the polish is performed by CMP.

41. A method for peeling off a semiconductor element according to claim 14, wherein
25 the polish is performed by CMP.